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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/808,360	03/25/2004	Samad M. Edlou	1857.0870001	4756
26111	7590	06/09/2006	EXAMINER	
STERNE, KESSLER, GOLDSTEIN & FOX PLLC 1100 NEW YORK AVENUE, N.W. WASHINGTON, DC 20005			LAVARIAS, ARNEL C	
			ART UNIT	PAPER NUMBER
			2872	

DATE MAILED: 06/09/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/808,360

Applicant(s)

EDLOU ET AL.

Examiner

Arnel C. Lavarias

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 03 April 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 April 2006 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Drawings*

1. The replacement drawings were received on 4/3/06. These drawings are objected to for the following reason(s) as set forth below.

2. The drawings are objected to because of the following informalities:

Figure 3- the arrow from reference numeral 300 is pointing to the incorrect surface of prism 200A. This arrow should point to the hypotenuse surface of the prism.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Response to Amendment***

3. The amendments to the specification of the disclosure in the submission dated 4/3/06 are acknowledged and accepted. In view of these amendments, the objections to the specification in Section 6 of the Office Action dated 1/23/06 are respectfully withdrawn.
4. The amendments to Claims 1-11 in the submission dated 4/3/06 are acknowledged and accepted.
5. The addition of Claims 12-13 in the submission dated 4/3/06 is acknowledged and accepted.

***Response to Arguments***

6. The Applicants argue that, with respect to Claims 1 and 6, as well as Claims 2-5, 7-11 which depend on Claims 1 and 6, Kardos et al. fails to teach or reasonably suggest the cube being a  $\text{CaF}_2$  cube, wherein the cube transmits deep ultraviolet or vacuum ultraviolet wavelengths of light substantially without absorption. After reviewing Kardos et al., the Examiner agrees, and respectfully withdraws the rejections in Sections 8-10 of the Office Action dated 1/23/06.
7. The Applicants further argue that, with respect to Claims 3 and 8, since the only known date of the Wikipedia references post-date the effective filing date of the instant application, these references may not be applied against the instant application, and that Applicants request documentary evidence pursuant to MPEP 2144.0(c). The Examiner respectfully disagrees. It is noted that Claims 3 and 8 were rejected solely on Kardos et al., and that the Wikipedia references were utilized merely to provide evidentiary support

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for knowledge that is extremely well known and old in the art, as well as necessarily inherent to SiO<sub>2</sub>. Since it appears Applicants are not familiar or aware of such chemical equivalence between SiO<sub>2</sub> (silicon dioxide) and fused silica, Applicants may additionally refer to Malitson (I. H. Malitson, 'Interspecimen comparison of the refractive index of fused silica', JOSA, vol. 55, no. 10, Oct. 1965, pp. 1205-1209.).

8. Claims 1-13 are now rejected as follows.

***Claim Objections***

9. Claim 4 is objected to because of the following informalities:

Claim 4, line 1- 'CaF<sub>2</sub>vcube' should read 'CaF<sub>2</sub> cube'.

Appropriate correction is required.

***Claim Rejections - 35 USC § 103***

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 1-2, 4-7, 9-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kardos et al. (U.S. Patent No. 5339441), of record, in view of McClay et al. (WO 01/63342 A1), of record, and Watanabe (U.S. Patent Application Publication US 2002/0005990A1).

Kardos et al. discloses a fused silica cube (See for example Figures 1-3; col. 2, lines 18-21) comprising an uncoated fused silica prism (See 12 in Figure 1); a coated fused silica prism (See 13 in Figures 1-3) coupled to a surface of the uncoated fused silica prism, the coated fused silica prism including a first coating section having a multilayered coating (See 33, 34 in Figure 2), and a second coating section formed on top of the first coating section, the second coating section having a contact layer coating (See 36 in Figure 2). Kardos et al. additionally discloses the contact layer coating being a  $\text{SiO}_2$  coating (See col. 3, lines 17-48); the cube being a polarizing cube (See Abstract); and the cube being a beam splitter (See col. 4, lines 52-60; col. 5, lines 18-25). Kardos et al. lacks the cube and prisms being made of  $\text{CaF}_2$ , wherein the  $\text{CaF}_2$  cube transmits deep ultraviolet or vacuum ultraviolet wavelengths of light, such as 157 nm, substantially without absorption. However, McClay et al. teaches a conventional polarizing beam splitter cube (See Abstract; Figures 1, 3), wherein the cube and prisms may comprise  $\text{CaF}_2$  material (See Figures 3-4), thus allowing ultraviolet wavelength operation at wavelengths below 170 nm, such as at 157 nm (See Abstract). Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the cube and prisms of the cube of Kardos et al., be made of  $\text{CaF}_2$ , as taught by McClay et al., for the purpose of extending the ultraviolet wavelength range of operation to wavelengths below 170 nm, such as 157 nm, while maintaining high optical transmissivity through the cube. The combined teachings of Kardos et al. and McClay et al. does not explicitly disclose the cube transmitting deep ultraviolet or vacuum ultraviolet wavelengths of light substantially without absorption. However, Watanabe

teaches a conventional optical element utilizing a  $\text{CaF}_2$  substrate and various layers, including  $\text{SiO}_2$  and  $\text{HfO}_2$  (hafnium oxide) (See Abstract; Paragraphs 0010, 0017-0019 of Watanabe), which are the very same layers utilized by Kardos et al. (See Figure 2; col. 3, lines 17-48 of Kardos et al.). In particular, Watanabe teaches that such layers may be high frequency sputtered or ion beam sputtered onto the substrate (See Paragraph 0010 of Watanabe). Further, Watanabe explains that if  $\text{SiO}_2$  is directly sputtered onto  $\text{CaF}_2$  substrate, a chemical reaction between the fluorine and the silicon at the  $\text{SiO}_2/\text{CaF}_2$  interface creates an altered stoichiometric composition at the interface, which induces absorption of incident ultraviolet light. Thus, by sputtering an additional  $\text{HfO}_2$  layer, which is un-reactive to fluorine, onto the  $\text{CaF}_2$  substrate prior to sputtering the  $\text{SiO}_2$  layer, such chemical reaction is eliminated and light absorption in the ultraviolet wavelengths is significantly reduced (See Paragraphs 0017-0019 of Watanabe). Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the cube of Kardos et al. and McClay et al., transmit deep ultraviolet or vacuum ultraviolet wavelengths of light substantially without absorption, as taught by Watanabe, for the purpose of maximizing optical transmissivity (i.e. reducing optical loss) through the cube in the optical wavelength range of operation.

12. Claims 3 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kardos et al. in view of McClay et al. and Watanabe.

Kardos et al. in view of McClay et al. and Watanabe discloses the invention as set forth above in Claims 1-2, 6-7, except for the contact layer coating being a fused silica coating. However, as is extremely well known in the art (See for example 'Fused quartz'

(Wikipedia) or Malitson (I. H. Malitson, 'Interspecimen comparison of the refractive index of fused silica', JOSA, vol. 55, no. 10, Oct. 1965, pp. 1205-1209.)), fused silica is chemically equivalent to  $\text{SiO}_2$ , but is specially manufactured. Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the contact layer coating be a fused silica coating, instead of  $\text{SiO}_2$ , in the device of Kardos et al. in view of McClay et al. and Watanabe, to take advantage of the physical properties imparted by fused silica, e.g. extremely low thermal expansion coefficient, high thermal stability, high UV and IR transparency, and high strength.

### ***Conclusion***

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.



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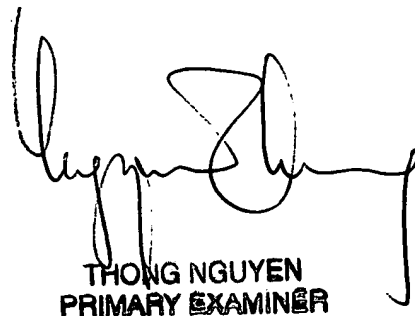
14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arnel C. Lavarias whose telephone number is 571-272-2315. The examiner can normally be reached on M-F 9:30 AM - 6 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 571-272-2312. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



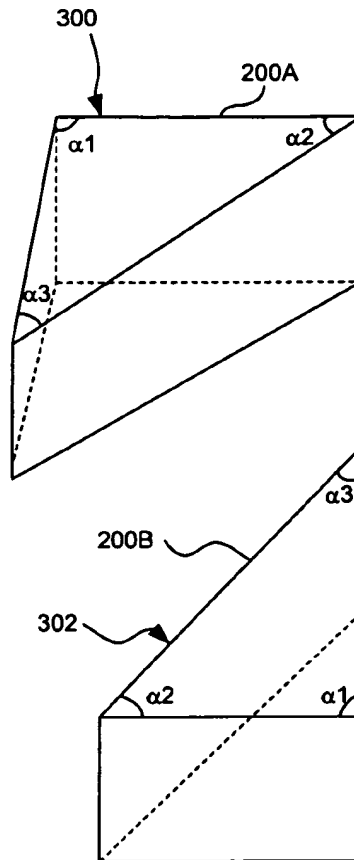
Arnel C. Lavarias  
6/7/06



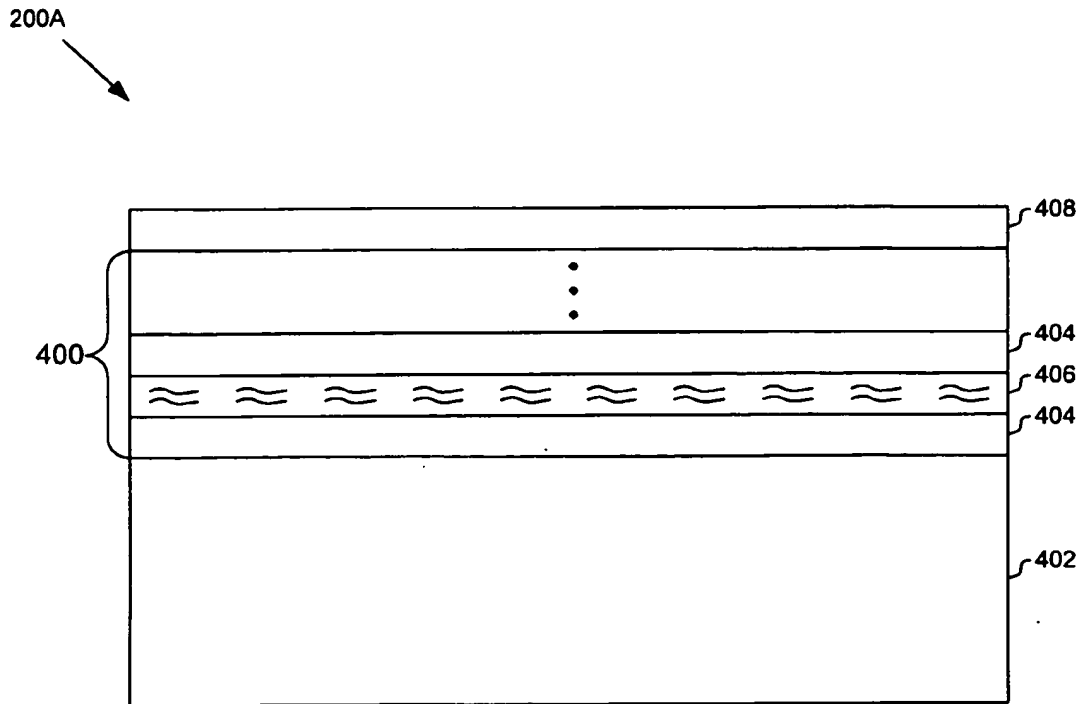
THONG NGUYEN  
PRIMARY EXAMINER



*Drawing Changes  
Approved  
JCC  
6/6/06*



**FIG. 3**



**FIG. 4**